



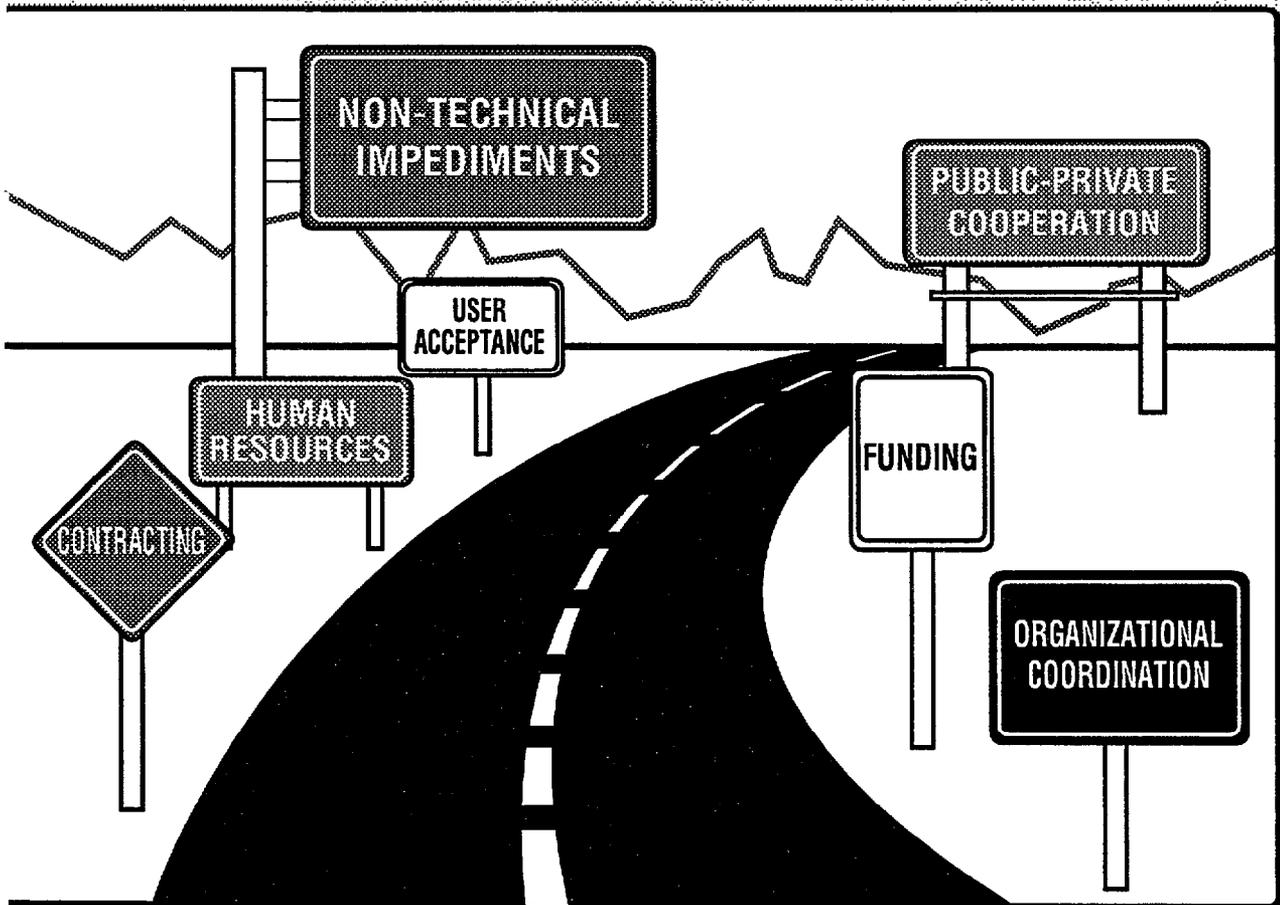
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**Federal Highway
Administration**

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Final Report
December 1994

REVIEW OF THE SMARTRAVELER OPERATIONAL TEST



Research and
Special Programs
Administration

John A. Volpe National
Transportation Systems Center



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13. ABSTRACT (Maximum 200 words) The SmarTraveler operational test was chosen by the FHWA to be the subject of a case study. Several case studies were performed under the Intelligent Transportation Systems (ITS) Institutional and Legal Issues Program, which was developed in response to the Inter-modal Surface Transportation Act of 1991. The objective of each case study was to determine (1) institutional issues and legal impediments encountered during the establishment of partnerships and deployment of ITS services and products during the operational test, (2) the point in the life cycle of the operational test at which the impediments occurred, (3) how project partners and participants overcame impediments, and (4) lessons that were learned that are applicable to future deployments of ITS products and services. This case study also describes the operational test and documents its history. Interviews for this case study were conducted during the summer of 1993.					
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Final Report

**ITS INSTITUTIONAL AND
LEGAL ISSUES PROGRAM**

**REVIEW OF THE SMARTRAVELER
OPERATIONAL TEST**

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December 1994

Prepared by

U.S. Department of Transportation
Research and Special Programs Administration
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Cambridge, Massachusetts

Prepared for

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Washington, D.C.

METRIC/ENGLISH CONVERSION FACTORS

ENGLISH TO METRIC

LENGTH (APPROXIMATE)

1 inch (in) = 2.5 centimeters (cm)
 1 foot (ft) = 30 centimeters (cm)
 1 yard (yd) = 0.9 meter (m)
 1 mile (mi) = 1.6 kilometers (km)

AREA (APPROXIMATE)

1 square inch (sq in, in²) = 6.5 square centimeters (cm²)
 1 square foot (sq ft, ft²) = 0.09 square meter (m²)
 1 square yard (sq yd, yd²) = 0.8 square meter (m²)
 1 square mile (sq mi, mi²) = 2.6 square kilometers (km²)
 1 acre = 0.4 hectares (he) = 4,000 square meters (m²)

MASS - WEIGHT (APPROXIMATE)

1 ounce (oz) = 28 grams (gr)
 1 pound (lb) = .45 kilogram (kg)
 1 short ton = 2,000 pounds (Lb) = 0.9 tonne (t)

VOLUME (APPROXIMATE)

1 teaspoon (tsp) = 5 milliliters (ml)
 1 tablespoon (tbsp) = 15 milliliters (ml)
 1 fluid ounce (fl oz) = 30 milliliters (ml)
 1 cup (c) = 0.24 liter (l)
 1 pint (pt) = 0.47 liter (l)
 1 quart (qt) = 0.96 liter (l)
 1 gallon (gal) = 3.8 liters (l)
 1 cubic foot (cu ft, ft³) = 0.03 cubic meter (m³)
 1 cubic yard (cu yd, yd³) = 0.76 cubic meter (m³)

TEMPERATURE (EXACT)

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METRIC TO ENGLISH

LENGTH (APPROXIMATE)

1 millimeter (mm) = 0.04 inch (in)
 1 centimeter (cm) = 0.4 inch (in)
 1 meter (m) = 3.3 feet (ft)
 1 meter (m) = 1.1 yards (yd)
 1 kilometer (km) = 0.6 mile (mi)

AREA (APPROXIMATE)

1 square centimeter (cm²) = 0.16 square inch (sq in, in²)
 1 square meter (m²) = 1.2 square yards (sq yd, yd²)
 1 square kilometer (km²) = 0.4 square mile (sq mi, mi²)
 1 hectare (he) = 10,000 square meters (m²) = 2.5 acres

MASS - WEIGHT (APPROXIMATE)

1 gram (gr) = 0.036 ounce (oz)
 1 kilogram (kg) = 2.2 pounds (lb)
 1 tonne (t) = 1,000 kilograms (kg) = 1.1 short tons

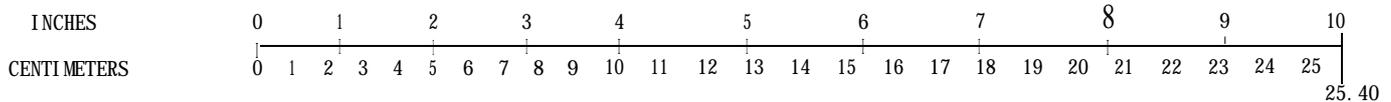
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 1 liter (l) = 2.1 pints (pt)
 1 liter (l) = 1.06 quarts (qt)
 1 liter (l) = 0.26 gallon (gal)
 1 cubic meter (m³) = 36 cubic feet (cu ft, ft³)
 1 cubic meter (m³) = 1.3 cubic yards (cu yd, yd³)

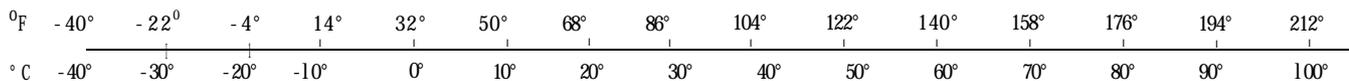
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PREFACE

In response to the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the United States Department of Transportation (U.S. DOT) developed the *Intelligent Vehicle-Highway Systems (IVHS) Institutional and Legal Issues Program*. (Now called the *Intelligent Transportation Systems (ITS) Institutional and Legal Issues Program*.) This program was designed to identify (1) issues that may constrain the full deployment of ITS products or services, (2) the means to overcome nontechnical barriers to ITS deployment, and (3) the lessons that were learned which might expedite the full deployment of ITS technologies.

This report was prepared by the U.S. DOT's John A. Volpe National Transportation Systems Center (Volpe Center) under the guidance of the Federal Highway Administration's (FHWA) Office of Traffic Management and Intelligent Vehicle - Highway Systems. The Volpe Center is providing analytical support to the U.S. DOT in the Operational Test Case Studies subject area of *the Institutional and Legal Issues Program*. This subject area calls for a national, independent, and cross-cutting evaluation of several operational tests. This evaluation will identify the problems and issues that participants in operational tests encountered when deploying ITS technologies and services and the important lessons that have been learned and may be applied in future deployments of ITS products and services. Other reports produced in the Operational Test Case Studies subject area are listed in Appendix C.

The Volpe Center has assessed nine federally sponsored operational tests with **the primary purpose** of answering four questions:

1. *What nontechnical impediments were encountered establishing partnerships and deploying ITS services and products during the operational test?*
2. *Where in the life cycle of the operational test did these impediments occur?*
3. *What were the causes of these impediments and how were they overcome?*
4. *What lessons were learned in dealing with these impediments that can be applied to future deployments of ITS products and services?*

In order to place the nontechnical issues in the life cycle of the development and the deployment of the ITS product or service, **the secondary purpose** of the assessments is to describe the operational test and document its history. These assessments are intended to be illustrative and descriptive in nature. They are not intended to be evaluative (i.e., comparing an observed outcome of the operational test to an expected level of performance) or show cause-and-effect (i.e., identifying whether the operational test has contributed to changes to a base condition or event). Also, these assessments are not intended to evaluate the technical components of the operational tests.

During the summer of 1993, a team of analysts, in accordance with the Volpe Center Project Memorandum, *IVHS Institutional Issues - Monitoring Program Framework*, interviewed 12 project participants from the operational test and reviewed project documentation. The interviewees represented federal and state transportation agencies, transportation information providers, and contractors to the test. These individuals were involved in various aspects of the operational test from policy making to program management to technical and administrative support. They included chief executives, corporate officials, program administrators, public relations personnel, and engineers. Many were involved in the initiation of the project while others were involved in day-to-day project activities. This diverse group of individuals provided the study team with a broad range of views about the SmarTraveler operational test and the ITS program in general.

The authors were sensitive to the criticism that project evaluations either seek out negative aspects of the project with little emphasis on positive lessons, are biased, or lay blame. The authors acknowledge that the assessments were oriented toward finding problems, but these assessments were also structured to identify positive lessons that were learned and that could be shared with others.

The authors thank the interviewees for taking time from their busy schedules to answer our questions and for their openness in doing so. The issues, lessons, and insights that they discussed will benefit the entire ITS effort.

Section 1 of this report is a summary of the project and of the issues and lessons learned that were discussed by the interviewees. **Section 2** describes the scope, history, and participants of the SmarTraveler operational test. It also discusses the stated project goals and objectives, the goals and objectives of the project participants, the benefits the interviewees foresee for participating in the project, the risks that they or their organization may be taking, and what they see as the critical success factors of the project. **Section 3** presents a more detailed discussion of the institutional issues and lessons learned.

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1. SUMMARY

This section presents an overview of the SmarTraveler operational test and a summary of the issues and lessons learned that were discussed by the interviewees.

1.1 PROJECT OVERVIEW

SmarTraveler is an advanced traveler information system (ATIS) that provides commuters with up-to-the-minute, location-specific traffic and transit information. The information provided includes traffic, road, and transit operating conditions; travel times; transit options; construction sites; and information on special events that might affect commuting. The project area covers approximately 1,400 square miles and encompasses 122 cities and towns in eastern Massachusetts and 701 miles of eighteen separate roadways or segments.

The SmarTraveler service collects, consolidates, and disseminates traffic and transit information to commuters. It collects transportation data through a complex network of video cameras, contracted mobile phone probes, informal mobile phone and two-way radio probes, two-way radio hookups with express buses and a helicopter fleet, electronic scanners that monitor approximately 300 radio frequencies, fixed wing aircraft, and direct hard-wire connections with four key state transportation agencies and the Massachusetts State Police (MSP). It uses an audiotext system to consolidate the data and disseminate the transportation information to commuters.

SmarTraveler was initially funded as an operational test and operated for a 14-month period from October 30, 1992 to December 31, 1993. The original cost of the test was \$3.1 million; approximately half of the funding was from the Federal Highway Administration (FHWA) intelligent vehicle-highway systems (IVHS) operational test program and the other half from private sector contributions. The SmarTraveler service operated under a three-month contract extension until March 31, 1994. Funding during this period was \$345,000 from FHWA statewide planning and research (SPR) funds and \$350,000 from private sector contributions. SmarTraveler later received another extension and will continue to operate until December 31, 1994. Funding for this period included \$892,000 from SPR funds, \$223,000 from the Massachusetts Highway Department (MHD) highway funds, and \$892,000 from private sector contributions.

The major project participants are the FHWA, the Bureau of Transportation Planning and Development (BTP&D) within the Massachusetts Executive Office of Transportation and Construction, SmartRoute Systems Limited Partnership (SRS), and the MI-ID. Representatives from these organizations make up the project management team.

Within the operational test there are several public agencies and private sector firms that provide in-kind services, such as marketing, advertising, and traffic and transit information. These

organizations are called partners. The public sector participants include the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (Massport), the Massachusetts Turnpike Authority (MTA), the MSP, and operational units of the MI-ID. The private sector participants include WCVB-TV, WBOS and WODS radio stations, American Trucking Association Foundation, New England Cable News, Metrovision, Cellular One, Hill Holliday Connors and Cosmopoulous, and the American Automobile Association.

Principals within SRS originally conceived SmarTraveler as a 3-year operational test to attract users from the traveling public; to determine the potential impact of this type of ATIS on travel; to assess new information collection, fusion and dissemination technologies; and to develop a privatization strategy for the delivery of real-time traffic and transit information. SRS conceived and presented the SmarTraveler concept to the FHWA before the establishment of a formal federal operational test solicitation process.

In April 1988, Enroute Systems, Inc., the predecessor to SRS, was started. Initially, the principals wanted to target the commercial vehicle market as the most likely consumer of traffic information services, to create a business-to-business market with fleets and cellular phone companies, and to become a bridge to advanced technologies. Enroute Systems perceived the traveling public as frustrated by the dearth of accurate, available, and site-specific information. The goal of Enroute Systems was to develop a real-time, on-demand, location-specific transportation information system which would gather, consolidate, and disseminate traffic information to the travelers. Enroute Systems began with a hardware approach and developed a prototype in-vehicle unit designed to gather and disseminate traffic information via cellular and other technologies. The company later shifted its approach and became a software information company geared toward packaging and reselling information. Enroute Systems was restructured in 1991 and became SmartRoute Systems, Inc.

In May 1991, SRS launched its traffic information system. The system was similar to the current operational test system, but had a smaller staff and covered a smaller geographical area. The NYNEX Corporation obtained exclusive rights to the service and offered it to its customers for one year. In addition, several employers offered the service to their employees, including GTE and Polaroid. The parking garage at Post Office Square in downtown Boston also provided the service to its customers. WCVB-Channel5 and WODS radio integrated SRS traffic information into their broadcasts.

In September 1991, SRS presented the idea of servicing the Boston metropolitan area with a free touch-tone phone accessible, real-time audiotext traffic and transit information service to the Office of Traffic Operations and IVHS. The FHWA and SRS developed a draft concept. After numerous proposal iterations, SRS principals and FHWA representatives established operational test goals and objectives. They hoped to obtain solid market information on traveler response to traffic information provided by SmarTraveler. They were also interested in learning about user response to an audiotext system and the system's impact on congestion levels.

On April 29, 1992, SRS and the MHD submitted "SmarTraveler: An Operational Test of an Area-wide ATIS Service for Eastern Massachusetts Final Proposal -- Scope of Work, Tasks and

Budget” to the FHWA. In July 1992, the FHWA granted conceptual approval. On September 2, 1992, the FHWA approved funding for the operational test and on October 30, 1992, issued a notice to proceed.

During the fall of 1992, the staffs of the FHWA, the BTP&D, and the Central Transportation Planning Staff (CTPS) collaborated on the proposal for evaluation. They agreed that project evaluation would focus on user response to the service through call interceptions and surveys. On December 17, 1992, the FHWA approved the evaluation proposal. In February 1993, Multisystems, Inc. was selected as the project evaluator. The contract was awarded in May 1993. The evaluation report was produced in July 1994.

Phase I, called the scale-up period, for the SmarTraveler operational test began on October 30, 1992 and lasted two months. Phase II, the operational phase, was “launched” on January 13, 1993. The Phase II was scheduled to end on December 13, 1993, but received an extension until March 31, 1994. SmarTraveler later received additional funding and will operate from April 1 to December 31, 1994 as Phase III.

1.2 ISSUES ENCOUNTERED BY PROJECT PARTICIPANTS AND LESSONS LEARNED

This subsection outlines the nontechnical impediments and the lessons learned discussed during face-to-face interviews with project participants. These issues and lessons are divided into eight categories:

- New Business Relationships
- Contracting
- Marketing
- Evaluation
- Organizational Coordination
- User Acceptance
- Operations
- Deployment

1.2.1 New Business Relationships

Similar to most operational tests, issues relating to establishing new business relationships emerged early in the life of SmarTraveler. By addressing these issues, the project participants learned several lessons. First, and most importantly, they stated that **the private and public sectors have discovered how to work together**. In the SmarTraveler operational test, this

meant that a small entrepreneurial firm was able to work with a large bureaucracy. One interviewee stated that this action is a real testament to the *flexibility* of IVHS programs.

Two public sector representatives offered a second lesson. They said that **partnerships should be formed early**. *New relationships take time* and must be in place at the start of the project. They added that in order for a true partnership to exist, a partner should appreciate the *value of the test* and want to *participate* in the project from the beginning. Do not force a partner to participate in the project.

A third lesson that was stressed was the participants should **clearly identify goals and objectives**. All parties must have a common *understanding* of the project's goals and should never lose sight of those goals. They should not spend time and effort not directly associated with the principal objectives.

Interviewees said that participation in this new area of IVHS requires *new institutional arrangements*. These new arrangements, such as the cooperative venture among the MHD, the FHWA, and SRS, were foreign to both sectors. The interviewees felt progress on the operational test was hindered because there were *no vehicles* or models that could be used as examples. One interviewee stated that it is difficult for *an old bureaucratic structure* to handle changes.

The interviewees also stated that *biases* of the private sector towards the public sector and vice versa still exist, although they are not always true. In general, the private sector feels that the public sector moves too slowly; the public sector thinks that the private sector want too large a profit.

In the case of SmarTraveler, a private firm initiated the partnership; most IVHS partnerships were not started this way. Also, the SRS principals approached the FHWA before a *national IVHS program* was developed. The SRS principals had to *convince* the public sector to support the SmarTraveler operational test. The FHWA agreed to fund the operational test but would not do so until SRS obtained *state support*. At the MHD working level, however, personnel did not have a sense of *ownership* and were reluctant to participate.

Another issue that caused concern was that although SRS was a principal participant in the operational test, the MHD had to execute a contract with the firm to pass federal funds to it. This action created a *customer-vendor* relationship between the MHD and SRS and caused some confusion regarding the roles of the BTP&D and SRS personnel. These two staffs dealt with each other in a *customer-vendor* relationship when addressing contract issues, but worked together as *partners* when dealing with program issues.

1.2.2 Contracting

Contracting issues also developed early in the life cycle of the operational test. Most issues developed because of the differences between the public and private sector contracting procedures. These issues provided **lessons** for the participants. The interviewees mentioned that

contracting and procurement issues will cause project delays, but these administrative problems can be overcome. They learned to be realistic when developing program schedules,

The participants also stressed that IVHS is a new area and *new institutional arrangements are* required. They felt that contracts required for IVHS projects may not be standard and may have different requirements. They also recognized that the *newness* of the project may affect bureaucratic procedures. They believed that the newness of the IVHS program also requires the involvement of senior level contract administrators to solve problems and modify procedures.

Representatives of the public sector stated that the SRS staff brought a private sector perspective into the operational test. These interviewees stated that the private sector did not understand the time-consuming nature of projects that operate on a *reimbursement* basis. The SRS staff never worked with a government agency before and, therefore, had *no previous experience with the* public sector and public contracting procedures. They also thought funding would be provided through a *grant* and not through a reimbursable contract.

Representatives of both the public and private sectors discussed the need for a different contract model. Established contractual methods used to acquire construction and consulting **services** may not be suited for an operational test. One private sector representative described the formal procurement process as a *nightmare*. The *time* required for the procurement process is too long for small entrepreneurial companies; they cannot absorb the costs resulting from delays. The public sector representatives were more comfortable with the contracting process, but two interviewees did say that the original contract *lacked flexibility*. A public official suggested that the lack of flexibility in the contract prevented the SRS staff from reacting to new developments quickly; they could not implement changes as needs dictated. There was no room for day-to-day learning and adjusting.

1.2.3 Marketing

The issues in this area started to become evident in the early stages of the project and they are not fully resolved. Based on their experience, the project participants learned several **lessons**. First, **little is known nationwide on how to market an ATIS product**. The participants also discovered that **the public sector has little experience in marketing**. The public sector should set marketing *standards* and not select specific marketing methodologies. It is important to get the right mix between the public sector participants and marketing strategists.

They also concluded that a **good marketing campaign is crucial** to the success of the operational test and **sufficient funds must be provided** for such a campaign. One public sector representative recommended testing the marketing strategy before starting the project. The market demand must be determined and a long-term marketing approach established. The interviewees recounted that **customer expectations must be met and not be violated**, such as informing users about charges for services.

A major aspect of the SmarTraveler operational test is the marketing of an IVHS service. Marketing of this service involved not only SRS but also several state transportation agencies. The SRS staff wanted to work with as many agencies as possible to leverage the project's limited advertising funds. These agencies, however, had *differing marketing approaches*. Marketing was also a *new* area for the MHD and FHWA staffs and they had different expectations of the marketing approach.

Both private and public sector representatives stated that *the limited advertising budget* may hinder learning how to position and market the product. The interviewees felt that the operational test did not have adequate promotional resources, and to a degree, is unable to prompt users to trial and routine use. *Inadequate marketing* may hinder public awareness of the system. Some interviewees suggested that the limited amount of funds caused the participants to limit their advertising during Phase II. In Phase III, \$170,000 of the SPR and MHD highway funds and all of the private sector contributions were set aside for marketing and advertising.

Two public sector interviewees stated that some of the advertising might *mislead* the public. SmarTraveler was promoted as a *free service*, but one cellular telephone company charges for the service and other users in the 508 area may get charged. Also, the service was promoted as having "*up-to-minute*" information, but the SRS offices are closed at certain times.

1.2.4 Evaluation

The principal lesson offered in the area of the project evaluation was to **make sure that all operational and evaluation components are in place at the same time**. This will ensure that all contracts can proceed simultaneously and that the evaluation is integrated with the technical aspects of the project. In the case of SmarTraveler, the operational component was in place long before the evaluation component.

One private sector participant **suggested** that evaluations should be more formative than summative or judgmental. The evaluation process should emphasize collecting data on what works and what does not work so that the test can be improved. In order to make IVHS technologies work, the evaluation process must be *iterative* and give *feedback* to program managers to help them modify the process during the life of the operational test. Two public sector representatives offered another lesson: **Be comfortable with the possibility of either positive or negative evaluation results**; a failure is just as valuable as a success.

During the initial discussions concerning the operational test, the project participants concentrated on the *technical* aspects of the project. The requirement for an evaluation surfaced later. Therefore, the project evaluator was selected after the operational test started.

Because the evaluation started after the operations did, the evaluator was not able to collect "before" data and develop a good baseline. This *lack of a baseline* may limit the extent of the

evaluation and caused some public officials to become skeptical of the evaluation. This skepticism decreased, however, as the operational test and the evaluation proceeded.

Also, in the early phase of the project, there was no clear definition of the objective of the evaluation. Private sector participants were interested using the evaluation findings to change and improve the service as quickly as possible, while the public sector representatives wanted to evaluate how the original system operated. The private sector representatives viewed the evaluation as *an iterative process*, providing project managers with information to improve the service as the operational test proceeded. They perceived the public sector view of an evaluation as a *pass-fail* test leading to a decision to continue or discontinue the project.

Private sector representatives stated that operational tests, especially those with user acceptance and marketing components, are difficult to evaluate. This is partly due to the *newness* of IVHS and because there was no pre-existing model on which to base the evaluation. These interviewees also said that the *lack of adequate tools* may hinder the evaluation. The effect of this issue may be that the evaluation does not demonstrate that usage of the service resulted in a change in driver behavior and, in turn, resulted in reduced congestion. They also stated that there is no clear definition as to what constitutes success in a market in which the end user is not paying for the service.

1.2.5 Organizational Coordination

In this area, the issues developed early in the project and, for the most part, have been resolved. Based on these issues, the interviewees stressed the **lesson** they learned was that **a multi-modal and cross-jurisdictional IVHS office would have facilitated the coordination and communications** among the various public agencies. This office should be charged with coordinating a *comprehensive IVHS program*. The establishment of such an office also may help overcome the perception that IVHS is mostly oriented toward highways. The interviewees also mentioned that **building a broad based coalition with all levels of government is valuable**, especially in ATIS.

One interviewee stated that a statewide IVHS program should be *interdepartmental* and *intermodal* and the public sector participants in this program need to communicate with each other. Several interviewees suggested that tradition prevents these communications from happening. Because the transportation agencies within Massachusetts have *distinct agendas* and separate functions, there was little need for coordination. One interviewee stated that the advent of IVHS has added a need for better communications among the agencies.

Because the project lacked a *sponsor* that had multi-modal and cross-jurisdictional authority, one interviewee believed this created a problem in soliciting agencies other than the MHD to be involved in the project. The other transportation agencies perceived the operational test as belonging to *one agency*, the MHD, because the MHD was the original supporter. Some of these agencies also may have felt that the project placed too much emphasis on highways. Much *time*

and *energy* were expended working with these agencies to gain their support and to ensure that the operational test encompassed any *many modes* as possible.

The project participants found out that sometimes **it is easier for the private sector to bridge public jurisdictions** than it is for a public agency; and when working with several public agencies, **it is easier to work with each agency** one-on-one rather than in large committees. To facilitate communications, the private sector participants *met separately* with representatives of the state transportation agencies. This action gained the cooperation of officials from these agencies and furthered their understanding of IVHS and ATIS. Good working *relationships developed* between the SRS staff and the partners.

1.2.6 User Acceptance

Issues in this area have developed throughout the project and continue to be issues. In the discussion of these issues, interviewees offered one very important **lesson: Make sure that the public understands that SmarTraveler offers a unique service and that it offers accurate information that does not duplicate radio broadcasts.** Make sure the service is perceived by the general public as a supplier of accurate information.

They also stated that technology exists to provide a good service, but its worth can be determined only if people use it. **Failure of the public to adopt the service may hinder the project being a success.** Also, they discovered that one cannot assume market acceptance and behavior modification relative to voluntary IVHS technologies.

The participants also learned that **associating the project with public agencies helped to establish better name recognition and credibility with the public.** In general, the interviewees stressed that **education is essential.** Educate the public by making the IVHS agenda accessible. Educate the public on ATIS and specifically, the SmarTraveler project.

Representatives from both the public and private sectors discussed the failure of making the public aware that SmarTraveler exists and provides information that differs from other traffic information sources. They stated that the public perceives SmarTraveler as being nothing more than a service that provides *the same information* that is already available over the radio. Also, focus groups interviewed by the project evaluator did not believe that good traffic information would be available. The public does not consider radio traffic reports reliable and has a low threshold for inaccurate information.

Project participants realized people *do not seek* traveler information *before* they leave their home or office. Usually, they do not think about traffic until they are stuck in it and tune into the radio for their information. Some commuters feel that there is nothing they can do about traffic congestion. It is also difficult to get people to *change modes* because traveling by automobile is convenient.

1.2.7 Operations

Operational issues are another set of issues that have not been fully resolved. The project participants learned several **lessons** as they operate the SmarTraveler operational test. First, one public sector participant suggested that **providing alternative route information would increase the usefulness of traffic information to the everyday commuter**. Representatives from the public sector discussed the long-standing MHD *policy* of not providing alternative route information and not diverting traffic through some city neighborhoods. This policy coupled with the fact that the Boston-area highway network is limited may *hinder* providing better transportation information to the public. The interviewees stated that if SmarTraveler offers no alternative routing information, the public is less likely to use it. Individuals may, however, use information provided by SmarTraveler to find route diversions independently.

Second, private and public sector participants learned to **be attentive to the information issue and the need for accurate information**. They **also** learned to **diversify their sources of information** and use as many as possible. Use of the system depends on the reliability of the information. The information that is provided must be good. When the operational test was started, some officials felt that the amount of *coverage* was insufficient. This, in turn, led the officials to question *the accuracy* and *reliability* of the traffic information. This issue was compounded by the fact that the MHD had no infrastructure for collecting the required traffic data in the Boston metropolitan area. In order to qualify for FHWA and MHD support, the amount of coverage had to be increased.

Third, the interviewees learned that **an incentive for managers should be created to permit information to flow freely** – even negative information. Some interviewees questioned the accuracy of the information that would be provided by the transportation agencies. They stated that transportation agencies may not be *reliable* sources of information because these agencies may withhold information indicative of poor agency performance. It has not been determined if these concerns have become an issue.

Fourth, one project participant felt that **the relevance of transportation information varies among modes**. This interviewee mentioned that the SmarTraveler system is much more useful to *commuter rail* users than to subways and bus users. The commuter rail runs on a schedule and, therefore, advance notice of delays is helpful. With respect to providing transit alternatives, the SmarTraveler system is better handling *special events* than it is handling day-to-day incidents. Road closings are known in advance and there is more time to react. More specific information can then be provided on regularly scheduled and additional transit service.

This participant also stated that *transit* information broadcast on the SmarTraveler radio and television partners only mentions system delays and reflects poorly on the transit system. The transit system needs to be mentioned when service is running smoothly and there should be more discussions of *transit alternatives*.

1.3 ISSUES THAT MAY BE ENCOUNTERED IN FUTURE OPERATIONAL TESTS OR DEPLOYMENTS

The issues that the interviewees discussed in the area of deployment were impediments that may be encountered in the future. First, they discussed that the process for moving an operational test into full deployment is not known. Because of the newness of IVHS and ATIS, the project participants do not know what is required to *fully deploy* the operational test. They must determine the amount of public and private *involvement*, the length of *time* needed to transition from a test to a deployment, and the sources *offunding*. Currently, there is no guarantee or vehicle for securing funding. One public sector policy maker stressed that the project participants must develop plans for the deployment of the project.

Some public and private sector interviewees offered conflicting **lessons**. One private sector representative said that if the public sector wants the private sector to help accomplish a public objective, such as alleviating congestion, then the public sector must be willing to *subsidize* the program. A public sector representative stressed that procedures for *phasing out public funding* must be established. This interviewee also stated that operational tests should not become a burden to public agencies, causing state agencies to decline supporting future operational tests.

Second, the project participants feared that small companies may not participate in deploying IVHS products and services. One private sector participant mentioned that a *mature industry* and *hard rules* may prevent small companies from entering the IVHS market. A new industry is initially open to small innovative companies. Opportunities for smaller companies, however, decrease once the stakes get higher. Eventually, larger business often *squeeze* them out of the industry.

This interviewee offered a **lesson**. The government must let the marketplace play itself out before implementing procurement processes. In particular, the FHWA needs to keep doors open to small companies and prevent larger companies from exhausting the market. The FHWA needs to promote the creation of new ideas. Another private sector representative suggested that the public sector must create or develop a market and provide an incentive for private sector participation.

Third, the participants warned that financial limitations may impede the deployment of IVHS technologies. One interviewee stated that the financial *constraints* imposed on the operational tests may limit the technologies that can be used by excluding currently *expensive technologies*. This, in turn, may limit the amount of information that can be gathered from the monitoring sites and the amount of information that can be disseminated to the public. Another interviewee believed that there are not enough operational tests which may hinder determining what technologies would be the best way to get information to travelers. One interviewee urged Congress to **put “bones” on the funding process** and allow the technologies to evolve naturally.

Fourth, the interviewees asserted that the lack of standards will affect the deployment of IVHS. One private sector representative stated that the potential for research and development (R&D) of IVHS technologies is constrained. Because private sector firms, especially small ones, are not sure what technologies will be used in IVHS applications, they *are reluctant to* invest in R&D. This lack of standards also restricts potential expansion of products and services to other agencies and geographical areas. One interviewee feared that advances in technology may outpace the development of a system architecture.

2. PROJECT OVERVIEW

This section describes the scope, history, and participants of the SmarTraveler operational test. It also discusses the stated project goals and objectives, the goals and objectives of the project participants, the benefits the interviewees foresee for participating in the project, the risks that they or their organization may be taking, and what they see as the critical success factors of the project.

2.1 PROJECT DESCRIPTION

SmarTraveler is an advanced traveler information system (ATIS) that provides commuters with up-to-the-minute, location-specific traffic and transit information. The information provided includes traffic, road, and transit operating conditions; travel times; transit options; construction sites; and information on special events that might affect commuting. The project area covers approximately 1,400 square miles and encompasses 122 cities and towns in eastern Massachusetts and 701 miles of eighteen separate roadways or segments.

SmarTraveler was initially funded as an operational test and operated for a 14-month period from October 30, 1992 to December 31, 1993. The original cost of the test was \$3.1 million; approximately half of the funding was from the Federal Highway Administration (FHWA) intelligent vehicle-highway systems (IVHS) operational test program and the other half from private sector contributions. The SmarTraveler service operated under a three-month contract extension until March 31, 1994. Funding during this period was \$345,000 from FHWA statewide planning and research (SPR) funds and \$350,000 from private sector contributions. SmarTraveler later received another extension and will continue to operate until December 31, 1994. Funding for this period included \$892,000 from SPR funds, \$223,000 from the Massachusetts Highway Department (MI-ID) highway funds, and \$892,000 from private sector contributions.

The SmarTraveler service collects traffic and transit data through a complex network of video cameras, contracted mobile phone probes, informal mobile phone and two-way radio probes, two-way radio hookups with express buses and a helicopter fleet, electronic scanners that monitor approximately 300 radio frequencies, fixed wing aircraft, and direct hard-wire connections with four key state transportation agencies and the Massachusetts State Police (MSP). The SmarTraveler system uses a synchronous audiotext system to consolidate and disseminate the project's information to commuters. The audiotext system is able to handle between 6,000 and 7,200 calls per hour, which may originate from land line or mobile telephone callers.

2.2 PROJECT PARTICIPANTS

The major project participants are the FHWA, the Bureau of Transportation Planning and Development (BTP&D), SmartRoute Systems Limited Partnership (SRS), and the MHD. The FHWA provides funding, technical, and program assistance, and coordination with other IVHS projects. The FHWA is the source of federal funding and had significant input into the development of the evaluation proposal. Representatives from these organizations make up the project management team.

The **BTP&D** administers the SmarTraveler contract. The BTP&D, an agency of the state Executive Office of Transportation and Construction (EOTC), serves as a liaison between SRS and the MHD, the contracting agency. The BTP&D staff also provide technical assistance and program management to the operational test. **SRS** is responsible for the day-to-day operations of SmarTraveler, providing the hardware, software, and staffing necessary for the collection and fusion of the data and the dissemination of information.

The **MHD** is the contracting agency for the SmarTraveler operational test. The MHD served as the conduit through which the FHWA channeled operational test funding to SRS. The MHD is involved in procurement and payment activities, including the preparation of required contractual documents and the review and payment of invoices. The MHD also participated in the project evaluation and provided 20% matching funds to the 80% federal commitment to the evaluation.

Within the operational test, there are several public agencies and private sector firms and associations that provide in-kind services, such as marketing, advertising, and traffic and transit information. These organizations *are* called *partners*. The public sector participants include the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (Massport), the Massachusetts Turnpike Authority (MTA), the MSP, and operational units of the MHD. The private sector participants include WCVB-TV, WBOS and WODS radio stations, American Trucking Association Foundation, New England Cable News, Metrovision, Cellular One, Hill Holliday Connors and Cosmopoulous, and the American Automobile Association.

In conjunction with the FHWA and BTP&D, the **Central Transportation Planning Staff** (CTPS), the technical staff of the Boston Metropolitan Planning Organization (MPO), formulated the SmarTraveler evaluation proposal and issued the request for proposals (RFP). The **Metropolitan Area Planning Council** (MAPC), one of the six members of the Boston MPO, served as the contracting agency for the evaluation contract. After the project evaluator was selected, the CTPS negotiated the contract with the project evaluator on behalf of the MAPC, and the MAPC executed the contract. The CTPS was responsible for technical oversight of the evaluation.

2.3 PROJECT HISTORY

Principals within SRS originally conceived SmarTraveler as a three-year operational test to attract users from the traveling public; to determine the potential impact of this type of ATIS on travel; to assess new information collection, fusion and dissemination technologies; and to develop a privatization strategy for the delivery of real-time traffic and transit information. SRS conceived and presented the SmarTraveler concept to the FHWA before the establishment of a formal federal operational test solicitation process. The development of the solicitation process and Phase I of the SmarTraveler operational test occurred simultaneously. In effect, SRS, the MHD, and the FHWA collaborated on the SmarTraveler operational test in the absence of an established and integrated IVHS program on both state and federal levels.

In April 1988, two years before the establishment of a federal IVHS program, an organized traffic information industry did not exist in the United States. Independent radio stations were the only sources of traffic information collection, fusion, and dissemination. John Liebesny, now President of SRS, considered radio reporting inadequate and current technologies underutilized and established Enroute Systems, Inc. The principals of Enroute Systems initially hoped that by targeting the commercial vehicle market as the most likely consumer of traffic information services, it could create a business-to-business market with fleets and cellular phone companies and become a bridge to advanced technologies. Enroute Systems perceived the traveling public as frustrated by the dearth of accurate, available, and site-specific information. The goal of Enroute Systems was to develop a real-time, on-demand, location-specific transportation information system which would gather, consolidate, and disseminate traffic information to the travelers.

Enroute Systems began with a hardware approach and developed a prototype in-vehicle unit designed to gather and disseminate traffic information via cellular and other technologies. Competition from larger companies, however, increased by 1990. Concurrently, the IVHS market for services and technologies began to crystallize in the nation's capital. Enroute Systems concluded that second tier cities probably would not require large infrastructures, but would benefit from "soft" ones instead. The company shifted its approach and became a software information company geared toward packaging and reselling information. Enroute Systems was restructured in 1991 and became SmartRoute Systems, Inc.

SRS chose the telephone as the best conduit for the dissemination of information and chose several technologies with which to collect data. In 1990, it leased and installed eight slow-scan, dial-up (freeze frame) video cameras at One Financial Center in downtown Boston. Other sites featured two-way radio capability, which SRS deployed independently. Later, SRS transformed the slow-scan cameras at One Financial Center into real-time cameras and used microwave technology to transmit the data. SRS also expanded two-way radio communications systems at SRS headquarters.

In May 1991, SRS launched its traffic information system. The system was similar to the current operational test system, but had a smaller staff and covered a smaller geographical area. The

NYNEX Corporation obtained exclusive rights to the service and offered it to its customers for one year. In addition, several employers offered the service to their employees, including GTE and Polaroid, and the parking garage at Post Office Square in downtown Boston provided the service to its customers. WCVB-Channel5 and WODS radio integrated SRS traffic information into their broadcasts.

In June 1991, the FHWA became interested in SRS's activities. SRS appeared to be a private sector practitioner of the technology and services that attracted the FHWA. In September 1991, SRS presented the idea of servicing the Boston metropolitan area with a free touch-tone phone accessible, real-time, audiotext traffic and transit information service to the then FHWA Director of the Office of Traffic Operations and IVHS, Norman Van Ness. The FHWA suggested that SRS find a project champion at the state level. Subsequently, SRS gained the support of James Kerasiotes, then Commissioner of the MHD. The FHWA and SRS developed a draft concept. After numerous proposal iterations, SRS principals and FHWA representatives established operational test goals and objectives. They hoped to obtain solid market information on traveler response to traffic information provided by SmarTraveler. They also were interested in learning about user response to an audiotext system and the system's impact on congestion levels.

In December 1991, the FHWA expressed concern about liability issues and whether or not SRS's data collection methods were adequate. In response to the FHWA's concerns, SRS improved the availability and accuracy of its data, and expanded operations to include transit information from the MBTA.

On April 29, 1992, SRS and the MHD submitted "SmarTraveler: An Operational Test of an Area-wide ATIS Service for Eastern Massachusetts Final Proposal -- Scope of Work, Tasks and Budget" to the FHWA. SRS requested conceptual approval of the operational test in order to fine-tune its technologies, assess costs, and keep private sector participants interested in the project. In July 1992, the FHWA granted conceptual approval. On September 2, 1992, the FHWA approved funding for the operational test and on October 30, 1992, issued a notice to proceed.

During the fall of 1992, the staffs of the FHWA, the BTP&D, and the CTPS collaborated on the proposal for evaluation. They agreed that project evaluation would focus on user response to the service through call interceptions and surveys. On December 17, 1992, the FHWA approved the evaluation proposal. In February, 1993, Multisystems, Inc. was selected as the project evaluator. The contract was awarded in May 1993. The evaluation report was produced in July 1994.

Phase I, called the scale-up period, for the SmarTraveler operational test began on October 30, 1992 and lasted approximately two months. During this time, SRS established direct communications links with the MHD radio room, the MBTA Central Control and commuter rail facilities, and the MSP Communications Center. Also in this phase, advertising promotions were discussed with the partners.

Phase II, the operational phase, started on January 13, 1993 with a "launch" press conference at which both Massachusetts Lieutenant Governor Paul Cellucci and Secretary of Transportation

Kerasiotes delivered addresses. The Phase II was scheduled to end on December 13, 1993, but received an extension until March 31, 1994. SmarTraveler later received additional funding and will operate from April 1 to December 31, 1994 as Phase III.

2.4 GOALS AND OBJECTIVES

The goals for the SmarTraveler operational test were taken from the report, "The SmarTraveler Operational Test--Early Findings" (SmartRoute Systems, 1993). The four objectives listed in this report slightly revised the original stated objectives:

- To demonstrate public acceptance and utility of widely available, telephonically delivered, real-time, location-specific traffic and transit information.
- To evaluate the impact on travel of widely available, telephonically delivered, real-time, location-specific traffic and transit information.
- To assess the effectiveness of new technologies in enhancing the collection, fusion, and dissemination of traveler information.
- To design and demonstrate the viability of a privatization strategy for the delivery of widely available advanced traveler information.

The project goals were compared to the goals and objectives stated by the interviewees to identify possible conflicts. There were no conflicts; the goals and objectives disclosed by the interviewees supported the stated project objectives. Five goals were mentioned three or more times:

(The numbers in parentheses in the following list and in the next three subsections represent the number of times an item was mentioned and the number of individuals who mentioned it.)

- To determine the public demand for traveler information and users' response to such information. (6-6)

This issue was discussed by representatives of both sectors and by policy makers, administrators, and marketing personnel. They discussed that learning the market demand for the information is a top priority. They also wanted to understand how the information may have affected the commuters' behavior, such as selecting a different mode, departure time, or route of travel.

Two individuals presented two obstacles to achieving this goal. A private sector representative said that the operational test may not last long enough to permit the public to modify their behavior and adopt a volunteer technology. A public sector official echoed this concern by stating that the public sector does not know how long it takes to achieve product acceptance in the marketplace. This interviewee also said that there is a

lack of experience in evaluating this type of project and the market information may not be adequately collected.

- To increase the traveling public's awareness of alternatives to the single-occupant vehicle. (7-5)

This goal was offered by policy makers, administrators, and marketing personnel in the public sector. These participants wanted to encourage alternative modes of transportation, such as car-pools, transit, and commuter rail. They also wanted to influence travelers to play a more proactive role in selecting a mode of travel.

Two interviewees expressed two obstacles to this goal. They said that inaccurate or untimely data, especially transit data, would negatively affect a commuter's decision to select an alternative mode of travel. One added that the lack of alternative routes may hinder the achievement of this objective.

- To provide readily available and accurate information to the public. (8-4)

This goal was discussed by four public representatives and one from the private sector. They wanted to provide better transportation information to the public. They wanted to fill the void perceived by commuters that transportation information is not accurate, not readily available, nor location specific. These interviewees wanted to provide this information to the public at home, at work, and in their vehicles using different technologies, such as telephones, cellular phones, and the electronic media.

One interviewee mentioned an obstacle. The cost to the user may prevent or discourage the travelers from using the service.

- To provide new business opportunities. (6-4)

This goal was offered by policy makers, administrators, and technical personnel in the private sector. They wanted the operational test to create a market for ATIS and advanced data collection technologies and to foster spin-off projects.

- To determine the potential of an ATIS. (3-2)

Two public sector project administrators wanted to determine if an ATIS would work and, if so, to determine the best structure for such a system.

2.5 BENEFITS

Nine benefits were mentioned by the interviewees three or more times. These benefits significantly mirrored the goals and objectives that the interviewees presented:

- An opportunity for collaboration between the public and private sectors. (5-5)

This benefit was discussed by policy makers, administrators, and marketing personnel in the public sector. One participant stated that the SmarTraveler operational test would provide information to determine how public-private relationships can be used throughout the entire IVHS arena. Another said that the operational test provided a good opportunity to gain experience in public-private collaboration and to examine new issues not previously encountered in public contracting. Another official indicated that participation in the operational test would show how receptive the public sector is to forming new partnerships with the private sector. The operational test also would provide the public with a good example of public-private collaboration.

- Learning the nuances of an ATIS. (7-3)

Policy makers from the public and private sectors primarily suggested this benefit. They commented that involvement in the SmarTraveler operational test would provide an opportunity to learn about the market for an ATIS. It also would provide an opportunity to understand the marketplace in terms of market size, advertising effectiveness, and adoption rates. They also said that the operational test would provide an opportunity to determine how an ATIS might work on a day-to-day basis, what kind of information is most valuable to the public, how a central clearing house for traffic information operates, and how to determine if telephone information is accessible enough to the public.

- Providing the opportunity to assess marketing strategies. (4-3)

Public sector participants from all levels stated that the operational test would help understand how to market traffic information services. It will indicate how potential users should be educated on IVHS technologies and how IVHS technologies should be marketed. The operational test will also provide a laboratory to study behavior changes that may result from marketing efforts.

- Improvement of the reputations of both the public and private sectors. (4-3)

Public and private sector representatives at all levels said that the operational test and the provision of information would both meet a public need and improve the image of the participants. A public sector participant indicated that the operational test would make the public aware that a public highway agency can provide a public service in addition to constructing and maintaining roads. Another participant indicated that the operational

test would help the private sector establish credibility with the public sector, the principal market for IVHS.

- Providing information to the traveling public. (4-3)

Public sector participants, especially those involved in marketing, commented that the SmarTraveler operational test provides the opportunity to disseminate good traffic information. This information would prepare travelers for the possibility of traffic congestion and encourage them to change their mode of travel.

- Opportunity for future business. (3-3)

This benefit was offered by both public and private sector participants. The private sector participants considered involvement in SmarTraveler as providing potential business opportunity by becoming involved in “longer range” traffic management solutions and “spin-off” projects. A public sector participant commented that it had established a relationship with SmarTraveler, which would be useful for potential future projects.

- Opportunity to employ various data collection and dissemination technologies. (5-2)

Both interviewees who discussed this benefit were from the public sector. One commented that collaboration in this operational test would provide an opportunity to establish a direct link to the reporting service and access to radio and television stations, and to exchange information between transportation agencies and SmartRoute Systems. The second called attention to the opportunity to gather information through radio frequencies and to use close-circuit television to monitor traffic and communicate information to transportation agencies.

- Improving awareness of transit. (4-2)

Two marketing personnel from the public sector said that the operational test established transit as an alternative route service, traffic reporting services gained a better understanding of transit issues, and transit awareness has increased.

- Providing an opportunity to determine the public’s use of traveler information. (3-2)

Two public sector participants said that the operational tests would help participants determine if the public is willing to use real-time information. It also will show how the public will use information accessed through variable message signs (VMS), highway advisory radio, and telephones. The operational test will help to determine the effects of traveler information on congestion and on the usage of transit and commuter rail systems.

2.4 RISKS

This section presents the risks that the interviewees or their organizations have or may face because of their participation in the SmarTraveler operational test. Five risks were mentioned three or more times:

- The reputation of the project participants may be damaged if the project fails. (7-5)

One public sector participant commented that the public may perceive certain participating public agencies as favoring and funding certain private entities; that certain public agencies may lose credibility if the project is discontinued; and that the public sector may have to take the blame if the project fails. A private sector participant was concerned that the reputations of private sector participants would suffer if the project appears to have failed. Another public sector participant feared that the public would think that participating agencies do not function well.

- The SmarTraveler service may not be fully deployed after the operational test is completed. (5-3)

One public sector participant commented that the SmarTraveler operational test might not be allowed enough time to move to full deployment and that it might not have access to public subsidies when it is ready to implement additional phases. One private sector participant was concerned that federal and state funding would not be readily available. Another public sector participant wondered if public agencies would be expected to continue sponsorship even if the project was viewed as a failure.

- Information provided by the system might be outdated, insufficient, or inaccurate. (3-3)

Three public sector participants discussed this risk. The first participant feared that if callers were referred to the SmarTraveler service, callers might receive inaccurate information. The second was concerned that the service would disseminate outdated information. The third wondered whether or not the project would produce enough information.

- If the operational test is perceived as a failure, future investment in IVHS activities in Massachusetts might be jeopardized. (3-2)

Two public sector participants feared that if the SmarTraveler operational test failed, the U.S. DOT and FHWA may become predisposed against further investments in operational tests in Massachusetts.

- Project participants may not be reimbursed for approved work. (3-2)

One private sector participant commented that a lack of guidance on federal regulations might result in inaccurate documentation of expenditures and that the failure to receive payment might result in an interruption of cash flow. One public sector participant mentioned that the FHWA might reject certain bill submissions because of improper documentation.

2.7 CRITICAL SUCCESS FACTORS

The interviewees also discussed critical success factors (CSFs) for the operational test. A CSF is a key area that must be successfully completed in order for the project to be considered a success. Four CSFs were mentioned three or more times:

- Accurate and timely information must be disseminated to the traveling public. (9-9)

Policy makers, administrators, and technical personnel from the private sector and policy makers, administrators, and marketing personnel from the public sector stressed this CSF. They said that the information provided by the system must be accurate and up-to-date. They said that the system must be able to detect, process, and deliver information in a useful manner. Also, the information provided by the partners to SRS must be reliable and current.

The participants stated that the achievement of this CSF could be measured by public interest, demand, and perception of the credibility of the system. They also stated that an insufficient data collection infrastructure and the lack of up-to-date information were potential obstacles to achieving this CSF.

- The service must reach and maintain a strong user base. (7-6)

Policy makers and administrators from the private sector and policy makers, administrators, and marketing personnel from the public sector proposed this CSF. They stated that there must be a documented public desire for the service and a reliance on it, demonstrated by a steady increase in usage and repeat use. In other words, market acceptance and market penetration must increase. This CSF can be measured by the number of callers to the service.

The interviewees suggested several obstacles that would impede achieving this CSF. These included a lack of funding for the marketing element, little incentive for travelers to use the information because of a lack of alternative routes, and the failure to allow enough time for the system to gain a large following. They also mentioned a poor perception of the accuracy of the information and an inherent resistance to change as additional obstacles.

- A market for traveler information must be identified. (4-3)

Public sector participants involved in policy making and project administration stressed this CSF. They felt that the operational test is valuable only if it proves that the private sector can locate a market. In other words, the service must be able to operate independently after the operational test ends. They also said that consumers must be willing to pay for the service. This gives rise to an obstacle; charging a fee for the service might result in a loss of market share.

- The service must prompt mode shifts. (3-2)

One public sector administrator stated that the service must prompt callers to use the information to make wise travel decisions and must make a positive impact on mode shifts. One private sector policy maker made similar statements regarding mode shifts and added that the service must reduce congestion. They plan to measure the success of this factor through telephone intercepts and caller surveys. They felt that the obstacles to this CSF would be convincing people to change modes, particularly those accustomed to the convenience of the automobile, and the public's general lack of knowledge and appreciation of the service.

3. ISSUES AND LESSONS LEARNED

This section presents the institutional issues or nontechnical impediments that the interviewees discussed. It also includes the lessons that they learned addressing these issues. The issues are divided into eight categories:

- New Business Relationships
- Contracting
- Marketing
- Evaluation
- Organizational Coordination
- User Acceptance
- Operations
- Deployment

3.1 NEW BUSINESS RELATIONSHIPS

This section discusses the four issues that project participants encountered and the lessons learned while developing a new form of business relations:

ISSUE 1: WORKING IN A PARTNERSHIP WAS NEW AND DIFFERENT FOR THE PRINCIPAL PARTICIPANTS

Representatives from both sectors and the policy and administration levels-discussed this issue. They stated that the major cause of this issue is the *systemic difference* between a small entrepreneurial firm and a large bureaucracy. Each sector has a *different culture*. They also mentioned that the public and private sectors harbor *biases* and suspicions of each other.

Interviewees said that participation in this new area of IVHS requires *new institutional arrangements*. These new arrangements, such as the cooperative venture among the MHD, the FHWA, and SRS, were foreign to both sectors. The interviewees felt progress on the operational test was hindered because there were no vehicles or models that could be used as examples.

The staff at the MHD and the BTP&D were not accustomed to working with *small companies* and with private sector firms as a partner. Developing a partner-type contract was a new experience for the MHD contracting personnel. Also, the MHD staff had never dealt with a project that contained a *marketing* component. SRS personnel had never worked with the public sector, and initially, the *firm* was not organized to handle the *requirements* of dealing with the public sector. For example, SRS did not have a dedicated contract administrator to prepare and submit required documentation.

One interviewee stated that it is difficult for *an old bureaucratic structure* to handle changes. The MHD had a structured review process, which could be slow and cumbersome at times. At the start of the project, SRS personnel expected decisions to be made quickly as in the private sector, and sometimes felt they needed *immediate answers* to advance work on the operational test. Some interviewees felt that SRS expected *priority treatment* while some MHD personnel viewed the SmarTraveler operational test as only one of many MHD projects. To the MHD staff, the SRS contract was relatively small, and the MHD could not allow it to take precedence over its other projects.

The lack of understanding of the different cultures early in operational test created a *negative working environment*. A cooperative spirit and flexibility between the principal participants did not exist. It took time for the public sector to *appreciate* the private sector and vice versa. One interviewee suggested that the SRS staff did not recognize the MHD's role as partner, just as contract administrator; and the MHD staff viewed SRS as a vendor and not a partner. Another interviewee stated that a true partnership did not develop during the early stages of the operational test.

The participants had to *go* through several *iterations* in reaching a mutually acceptable work plan. Subsequently, the original contract had to be rewritten to include more *flexibility* for the private sector. Other aspects of the project also took longer than expected.

The most important lesson that **was** learned was **the private and public sectors have discovered how to work together**. In the SmarTraveler operational test, this meant that a small entrepreneurial firm was able to work with a large bureaucracy. One interviewee stated that this action is a real testament to the flexibility of IVHS programs. The participants stated other lessons:

- A welcoming atmosphere and infrastructure are needed to develop a beneficial public-private partnership.
- The biases of the private sector towards the public sector and vice versa are not always true. Biases, however, still exist. The private sector feels that the public sector moves too slowly; the public sector thinks that the private sector want too large a profit.
- A cooperative relationship among all government agencies and private entities is essential including the involvement of transit agencies.
- Develop a strong understanding of the responsibilities of each project participant.
- Educate private firms on how to deal with public agencies and vice versa.
- Clearly identify goals and objectives. All parties must have a common understanding of the project's goals. Never lose sight of the project's objectives. Do not spend time and effort not directly associated with your principal objective.
- All parties should present their expectations clearly and respect each other's goals.
- Encourage participating public agencies to establish goals for themselves.

- Establish the particulars of the project, especially when dealing with private partnerships and other entities that have not worked on government projects. This will eliminate misunderstandings.
- Working on government projects can be cumbersome.
- The private sector must understand that a return on investment will not occur immediately. It needs to take the risk of delayed profit.

ISSUE 2: A PRIVATE SECTOR FIRM INITIATED THE CONCEPT FOR THE OPERATIONAL TEST

In the case of SmarTraveler, a private firm initiated the partnership. Most IVHS partnerships were not started this way. The SRS principals had to *convince* the public sector to support the SmarTraveler operational test. SRS did not respond to the FHWA RFP, but approached the FHWA HQ staff directly. The FHWA agreed to fund the operational test but would not do so until SRS obtained *state support*. SRS personnel spend significant resources soliciting public support and found that support in then MHD Commissioner Kerasiotes.

At the MHD working level, however, personnel did not have a sense of *ownership* and were reluctant to participate. Some felt that the FHWA *pressured* the MHD staff to participate in the project. Some interviewees mentioned that the initiation of the project in the private sector caused friction between the private sector and state participants. This friction may have caused project personnel in both sectors to devote more time than expected in developing an acceptable work plan.

Two public sector representatives offered one very important lesson. They said that **partnerships should be formed early**. *New relationships take time* and must be in place at the start of the project. They added that in order for a true partnership to exist, a partner should appreciate *the value* of the test and want to *participate* in the project from the beginning. Do not force a partner to participate in the project. The interviewees offered some additional lessons:

- It is difficult for a private firm to pull a project through the public process.
- If a state agency is to be the conduit for funding, it must be brought into the process early.
- If participants are brought in “after the fact,” they will probably have different ideas on how to proceed.
- Team building should take place on the local level, without direct involvement of FHWA headquarters.

ISSUE 3: A PROJECT PARTNER IS ALSO A VENDOR

Although SRS was a principal participant in the operational test, the MHD had to execute a contract with the firm to pass federal funds to it. This action created a *customer-vendor* relationship between the MHD and SRS and caused some confusion regarding the roles of the BTP&D and SRS personnel. These two staffs dealt with each other in a *customer-vendor*

relationship when addressing contract issues, but worked together *as partners* when dealing with program issues.

One interviewee did not regard this as an issue. This participant said that public agencies see public-private relationships being similar to *normal vendor* contracting relationships. The private sector, however, may have different expectations and emphasize being a partner rather than a vendor. This difference may lead to a misunderstanding of roles. Another interviewee offered a **lesson**: It is essential to **build a close working relationship** among the contracting parties.

ISSUE 4: PLANS FOR THE SMARTRAVELER OPERATIONAL TEST DEVELOPED SIMULTANEOUSLY WITH THE NATIONAL IVHS PROGRAM

SRS principals approached the FHWA before a *national IVHS program* was developed. Because the solicitation process was not in place, the FHWA did not have a process to evaluate prospective projects. Phase I of the SmarTraveler operational test and national IVHS program developed *concurrently*. Progress on implementing the operational tests stopped after the ISTEA was passed by Congress to allow the FHWA to develop a solicitation and proposal evaluation process.

The first SmarTraveler plan was very broad and did not include all of the components that would be required by the FHWA. This caused the FHWA and SRS staffs to go through an extended *iterative process* to develop a plan that ensured that the SmarTraveler project would fulfill the national program objectives. Although this process was very lengthy, it produced an acceptable work plan. One public sector participant felt that 12 months of negotiation could have been avoided if procedures were in place to evaluate and advance operational tests. This interviewee also suggested that the FHWA should give *support and advice* to creators of the operational tests, but not be involved directly in the development of proposals.

3.2 CONTRACTING

This section discusses the three issues and lessons learned in the area of contracting:

ISSUE 1: THE PRIVATE SECTOR PARTNER WAS NOT FAMILIAR WITH FEDERAL AND STATE CONTRACTING REGULATIONS

Representatives of the public sector stated that the SRS staff brought a private sector perspective into the operational test. These interviewees, who were policy makers and administrators, stated that the private sector did not understand the time-consuming nature of projects that operate on a *reimbursement* basis. They also said that the SRS staff did not realize how long the pre-award audit and the sole-source contract process would take. Although the MHD and BTP&D officials *expedited* the pre-award audit and contract processes, the SRS principals perceived it as a

significant delay. Also, the SRS accounting system was not established to accommodate federal and state contract *reporting requirements*.

The primary cause of this issue was that the SRS staff never worked with a government agency before and, therefore, had *no previous experience* with the public sector and public contracting procedures. Second, the SRS principals did not realize that the FHWA did not fund the project directly and that the FHWA *reimburses* the Commonwealth of Massachusetts after the Commonwealth pays the SRS invoices. The SRS staff thought funding would be provided through a grant.

Third, at the start of the operational test, SRS was considered a *fledgling company* and was not prepared to administer a \$3 million contract. SRS lacked the proper accounting mechanism to account for project finances. Fourth, the MHD had to send *the SRS sole-source* contract to another state agency, the Executive Office for Administration and Finance, for approval. This added additional time to the contracting process.

This issue affected the project in several ways. First, the MHD staff had to spend time on administrative matters rather than on technical project oversight. For example, after the pre-award audit, an MI-ID auditor had to *train* the SRS staff in government accounting procedures and federal standards. Second, the SRS staff entered into *subcontracting* agreements without prior approval of the MHD. Although this allowed SRS to negotiate subcontracts faster than if it had procured the equipment or services under normal review procedures, this procedure was not acceptable under the terms of the contract. Also, the subcontracts reflected higher rates than the rates secured through proper channels.

Third, because proper subcontracting procedures were not followed, the MHD Board of Commissioners had to approve retroactively the SRS subcontracts, and the General Counsel of the MHD sent a letter of *admonition* to SRS. Fourth, the working relationship between SRS and the MHD became difficult and time-consuming. *Friction* developed, and the staffs of SRS and the MHD began to distrust each other. MHD officials developed a negative *attitude* toward SRS and the operational test.

The interviewees from both sectors presented several lessons that were learned by addressing this issue:

- Administrative problems can be overcome.
- Contracting and procurement issues will cause project delays; the amount of the delay will depend on the scope of the project. Be realistic when developing program schedules.
- Many private sector entities are not set up to receive public funds.
- Educate private sector partners on the requirements of entering into a public contract.
- Inform private sector members that working with the government involves different procedures than working with the private sector.

- It takes time to educate firms who have never dealt with public agencies on federal and state contracting procedures.

ISSUE 2: ESTABLISHED CONTRACTUAL METHODS USED TO ACQUIRE CONSTRUCTION AND CONSULTING SERVICES WERE ALSO USED FOR THE OPERATIONAL TEST

This issue was discussed by representatives of both the public and private sectors. One private sector representative described the formal procurement process as a *nightmare*. The *time* required for the procurement process is too long for small entrepreneurial companies; they cannot absorb the costs resulting from delays. This interviewee also stated that there was a sixty- to ninety-day period during which bills were not paid by the state and that there was no vehicle for the payment of advance work.

The public sector representatives were more comfortable with the contracting process, but two interviewees did say that the original contract *lacked flexibility*. A third public official recognized that the period of time required by the MHD for invoice processing presented difficulties for SRS because SRS relies heavily on *cash flow* from MHD. The MHD invoice process normally takes 45 days-15 for invoice review and 30 for payment. The MHD direct expense policy that called for pre-approval and a one-month notice also presented a problem.

The primary cause of this issue was the *newness* of the IVHS program. One private sector representative felt that at the start of the project the federal agencies were more *familiar* with the program than the state agencies. Another cause forwarded by a private sector interviewee was that it is difficult for a well-established bureaucratic structure to handle *changes*, and the state agencies were not geared to operating in a new area.

A public sector interviewee said another cause is that government contracts often restrict *flexibility*. A private sector representative said that the difference in *perspective* between the public and private sector was a cause. The public sector process is employed to protect the integrity of public funding sometimes at the expense of *efficiency*. This interviewee also said that *the accrual* of project charges on a labor-overhead-indirect cost basis is inappropriate for procuring a "hi-tech" information service.

The interviewees stated numerous effects that this issue had on the operational test. The primary effect was that *the flow of funding* was interrupted and SRS experienced some cash-flow problems. Some *payrolls* were not met or were paid from personal accounts. Another problem was that *vendors* were not always paid in a timely fashion and some refused to perform because they were not being paid. This interrupted cash flow also delayed hiring, financing, and purchasing decisions and the start of the public relations campaign. A public official suggested that the lack of flexibility in the contract prevented the SRS staff from reacting to new developments quickly; they could not implement changes as needs dictated. There was no room for day-to-day learning and adjusting.

The MHD took two major steps to help alleviate the issue. First, the MHD amended the SRS contract to *modify* the pre-approval requirement for the expenditure of resources. The prior approval of direct cost was changed from one month to one day. Second, the MHD implemented a *one-week processing time* on payroll and invoices instead of its usual 45-day processing time.

Public and private representatives offered several **lessons**:

- IVHS is a new area and new institutional arrangements are required.
- Recognize that contracts will be different and the need to modify procedures.
- Fluidity and flexibility do exist in the current system.
- Contracting procedures can be improved especially with respect to small companies.
- If the product of the contract is an information system, price it as such. Do not rely on construction-type contracts. Procurement of weather information or Dow Jones services should be viewed as procurement models for government agencies purchasing information.
- Because of the newness of the IVHS program, the involvement of senior level contract administrators is needed to solve problems and modify procedures. The job of a junior contract administrator is to administer existing rules.
- Administrative procedures must be established prior to the start of a project, including timing, scheduling, marketing and payment.
- Increase flexibility of large bureaucracy by making sure that all contractors understand their roles, by acknowledging that this type of contract is not standard and has different requirements, and by recognizing that the newness of the project affects bureaucratic procedures.
- There is a need to create business, procurement, and accounting models that can be used in similar ventures.

ISSUE 3: THE USE OF A SOLE SOURCE CONTRACT WAS QUESTIONED

After SRS was selected and awarded a sole *source* contract, some public officials questioned whether there should have been a competitive process for this operational test. This concern became greater when some thought that another vendor of traffic information might sue. One interviewee stated that issuing an RFP might have shortened the time it took to develop an acceptable proposal. This issue, however, has not affected the project.

3.3 MARKETING

The section addresses three issues that the interviewees encountered in the area of marketing:

ISSUE 1: SMARTROUTE SYSTEMS AND THE OTHER PARTNERS HAD DIFFERING MARKETING AGENDAS

A major aspect of the SmarTraveler operational test is the marketing of an IVHS service. Marketing of this service involved not only SRS but also several state transportation agencies, which were partners. The SRS staff wanted to work with as many agencies as possible to leverage the project's limited advertising funds. These agencies, however, had *differing marketing approaches*.

Public sector representatives presented several causes to this issue. First, all partners had *financial constraints*. Second, project participants wanted the partners to give the SmarTraveler promotions a high priority; whereas, some of the partners had *established marketing programs* and viewed promotions for SmarTraveler as just another project. Third, marketing was a *new* area for the MHD and FHWA staffs and they had different expectations of the marketing approach. Fourth, some agencies had *regulations* which governed how promotional material was prepared.

This issue affected the project in several ways. The partners provided as much *support* as possible given their budget constraints. In some instances, the SmarTraveler project was promoted *intermittently* because the partners had to promote other events. Other tried to accommodate the promotions in their *day-to-day* operations. Also, the marketing campaign was *modified* to incorporate the concerns of the FHWA and MHD. Different marketing viewpoints, however, increased the *time* it took to reach an agreement on how to proceed.

The use of VMS to promote SmarTraveler is a good example of this issue. The project participants wanted SmarTraveler promoted as frequently as possible on the VMS. One partner had a policy that stated that the VMS are a public service and does not permit exclusive use of the VMS. Also, the equipment was not always available for SmarTraveler promotions. The agency gives messages needed to respond to crises priority over SmarTraveler and other messages during daily VMS operations. This policy meant that SmarTraveler was *not promoted regularly* on the VMS.

Several partners stated that the joint marketing promotions increased the *visibility* of their agencies and their information services. The promotions were *mutually beneficial* to the SmarTraveler test and to the individual agency. The representative of one partner stated that the agency used their discussions with SRS to *review* the agency's existing communications and to evaluate its promotions.

The interviewees offered these **lessons**:

- Understand the agendas, goals and objectives of each partner and how it views its consumers and the market.
- Recognize that the partners may have incompatible goals.
- When dealing with a new party, find common areas on which to work.
- Developing a strategy with each participating agency is time-consuming.
- Nationwide, little is known on how to market an ATIS product.

ISSUE 2: ADEQUATE FUNDING WAS NOT PROVIDED FOR MARKETING

Both private and public sector representatives expressed this concern. They stated that the *limited advertising budget* may hinder learning how to position and market the product. The interviewees felt that the operational test did not have adequate promotional resources, and to a degree, is unable to prompt users to trial and routine use. *Inadequate marketing* may hinder public awareness of system.

The interviewees offered several causes. First, *an inadequate amount of funding* was allocated for marketing, which is key for a project of this nature. Second, government representatives did not have *expertise* in marketing and did not understand its importance.

Interviewees felt that the limited amount of funds caused project participants to limit their advertising. They *only* used partners and *the in-kind services* that the partners provided. Another effect is that the promotional campaign is not reaching as many commuters and travelers as possible. As some interviewees expressed, this, in turn, means that the SmarTraveler operational test has *not progressed* as much as expected.

The project participants have been addressing this issue. During Phase II, the SRS staff identified new private sector organizations, such as Fenway Park and the Boston Garden, and solicited contributions. Most of these contributions were advertising and marketing support. In Phase III, \$170,000 from the SPR and MHD highway funds and all of the private sector contributions were set aside for marketing and advertising. The participants hired a marketing consultant who prepared a marketing plan for Phase III.

The interviewees discussed two **lessons**:

- Allocate more funding to marketing because a good marketing campaign is crucial to the success of the operational test.
- Determine market demand and establish a long-term marketing approach.

ISSUE 3: SOME SMARTRAVELER ADVERTISING WAS CONSIDERED INACCURATE

Two public sector interviewees stated that some of the advertising might *mislead* the public. First, SmarTraveler was promoted as a *free service*. One cellular telephone company, however, charges for the service and other users having the 508 area code may get charged. Second, the service was promoted as having “*up-to-minute*” information, but the SRS offices are closed at certain times.

One effect of this issue was that the advertising was *modified* to address these concerns. A possible effect might be a *loss* of users who expect to pay nothing but get charged for the call to SmarTraveler. A more serious effect would be the possible *failure* of the SmarTraveler operational test through a loss of callers.

The main **lesson** that was offered was **customer expectations must be met and not be violated**, such as informing users about charges for services. Two public sector representatives added that the public sector has *little experience* in marketing. The public sector should set marketing *standards* and not select specific marketing methodologies. Get the right mix between the public sector participants and marketing strategists. Another public sector representative recommended testing the marketing strategy before the actual start of the project.

3.4 EVALUATION

The interviewees discussed three issues concerning the project evaluation:

ISSUE 1: THE EVALUATION WAS NOT AN INTEGRAL PART OF THE PROJECT CONCEPT

During the initial discussions concerning the operational test, the project participants concentrated on *the technical* aspects of the project. The requirement for an evaluation surfaced later. One public sector representative stated that this issue caused a strain in the advancement of the project.

The most significant effect was that the project evaluator was selected after the operational test started. Before the evaluation contractor started working, the SRS staff performed some of the evaluation functions. They started to intercept calls and survey users. They stopped intercepting calls, however, when callers complained. This resulted in a loss of opportunity to research call intercepts, especially during major incidents.

Because the evaluation started after the project did, the evaluator was not able to collect “before” data and develop a good baseline. This *lack of a baseline* may limit the extent of the evaluation. The postponing of call intercepts and the lack of a baseline caused some public officials to become skeptical of the evaluation. This skepticism decreased, however, as the operational test and the evaluation proceeded.

The principal **lesson** offered by three public sector participants was **make sure that all operational and evaluation components are in place at the same time**. This will ensure that all contracts can proceed simultaneously and that the evaluation is integrated with the technical aspects of the project. In the case of SmarTraveler, the operational component was in place long before the evaluation component.

ISSUE 2: THE PUBLIC AND PRIVATE SECTOR HAD DIFFERENT EVALUATION OBJECTIVES

In the early phase of the project, there was no clear definition of the objective of the evaluation. Private sector participants were interested using the evaluation findings to change and improve the service as quickly as possible, while the public sector representatives wanted to evaluate how the original system operated. The private sector representatives viewed the evaluation as an *iterative process*, providing project managers with information to improve the service as the operational test proceeded. They perceived the public sector view of an evaluation as a *pass-fail* test leading to a decision to continue or discontinue the project.

The interviewees also suggested that the private sector is focusing on market issues, while the public sector on the technology. This meant that the public sector has a more quantitative approach to evaluation. The principal effect of this issue was that the SRS staff made *changes* to the service during the course of the operational test before the evaluation of the original test design was completed.

One private sector participant **suggested** that evaluations should be more formative than summative or judgmental. The evaluation process should be collecting data on what works and what does not work so that the test can be improved. In order to make IVHS technologies work, the evaluation process must be *iterative* and *give feedback* to program managers to help them modify the process during the life of the operational test.

ISSUE 3: OPERATIONAL TESTS ARE DIFFICULT TO EVALUATE

Private sector representatives stated that operational tests, especially those with user acceptance and marketing components, are difficult to evaluate. This is partly due to the *newness* of IVHS and because there was no pre-existing model on which to base the evaluation. These interviewees also said that *the lack of adequate tools* may hinder the evaluation. The effect of this issue may be that the evaluation does not demonstrate that usage of the service resulted in a change in driver behavior and, in turn, resulted in reduced congestion. They also stated that there is no clear definition as to what constitutes success in a market in which the end user is not paying for the service.

Citing a specific example, one public sector representative stated that it is difficult to determine the effectiveness of promoting SmarTraveler on VMS. SmarTraveler was promoted on the VMS during inclement weather, and calls to the service increased. In this instance, there was no way to determine if the increased number of calls was the result of bad weather or the VMS message.

Two public sector representatives offered a **lesson: Be comfortable with the possibility of either positive or negative evaluation results.** A failure is just as valuable as a success. Future decisions will be based on these results.

3.5 ORGANIZATIONAL COORDINATION

There were four issues discussed regarding cooperation within and among agencies:

ISSUE 1: COMMUNICATIONS AMONG THE TRANSPORTATION AGENCIES IN MASSACHUSETTS COULD BE IMPROVED

One interviewee stated that a statewide IVHS program should be *interdepartmental* and *intermodal* and the public sector participants in this program need to communicate with each other. Several interviewees suggested that tradition prevents this communication from happening. Because the transportation agencies within Massachusetts have *distinct agendas* and separate functions, there was little need for coordination. One interviewee stated that the advent of IVHS has added a need for better communications among the agencies. This interviewee also said that increased communications is not promoted because Massachusetts lacks a cross-jurisdictional IVHS office that is charged with coordinating a *comprehensive IVHS program*.

To facilitate communications, the private sector participants *met separately* with representatives of the transportation agencies. This action gained the cooperation of officials from the state transportation agencies and furthered their understanding of IVHS and ATIS. Good working *relationships developed* between the SRS staff and the partners. One interviewee, however, raised a concern over this procedure of meeting individually with the transportation agencies. This interviewee said that there was no direct sharing of information among the agencies and that the functional and financial resources of the other agencies were not disclosed.

The interviewees offered several **lessons**:

- To overcome the perception that IVHS is mostly oriented toward highways, the project administrator must have multi-modal and cross jurisdictional authority. Port authorities, van pool agencies, etc. must participate in IVHS programs.
- Building a broad-based coalition with all levels of government is valuable, especially in ATIS.
- Sometimes it is easier for the private sector to bridge public jurisdictions than it is for a public agency. The SRS staff has worked to achieve the cooperation of many agencies.
- When working with several public agencies, it is easier to work with each agency one-on-one rather than in large committees.
- Project participants should gain more insight into the activities of other participants.

- Working with the SRS staff was a constant reminder of communications issues that an agency internally needs to address daily.

ISSUE 2: THE STAFFS OF SOME TRANSPORTATION AGENCIES RESISTED CHANGE

Most of the transportation agencies had *standard procedures* for disseminating information to the public. When these agencies joined the operational test, *changes* to these procedures had to be made. Some staff members *resisted* these changes and had to be convinced to provide information to SmarTraveler. In one instance, the staff of a transportation agency information center thought that participation in the operation test would negatively effect their jobs. They also felt that the agency information flowed more easily to the SmarTraveler system than internally to them. One interviewee stated that *poor planning* within the interviewee's agency contributed to some resistance. Also, employees questioned the need to have an outside organization provide information normally disseminated by the agency.

This issue was resolved as agency liaisons to *the test explained* the test to the employees and *worked* with them to incorporate changes. Direct links between SRS with the MHD radio room, the MBTA Central Control, the Massport, the MSP, and the MTA were established. The flow of information within two agencies actually *improved* because of this effort.

ISSUE 3: INITIALLY, IT WAS DIFFICULT TO OBTAIN THE SUPPORT OF THE TRANSPORTATION AGENCIES

The project lacked a *sponsor* that had multi-modal and cross-jurisdictional authority. According to one interviewee, this created a problem in soliciting agencies other than the MHD to be involved in the project. The interviewee suggested that the other transportation agencies perceived the operational test as belonging to *one agency, the MI-ID*, because the MHD was the original supporter. Some of these agencies also may have felt that the project placed too much emphasis on highways. Much *time and energy* was expended working with these agencies to gain their support and to ensure that the operational test encompassed *any many modes* as possible. One interviewee stated that although the interviewee's agency agreed to work as a partner, the agency does not claim ownership of the operational test.

A project participant offered a **lesson** similar to the one discussed under Issue 1. This representative stressed the need for an *"IVHS Office"* at the federal and state levels.

ISSUE 4: ONE STATE AGENCY IS RESPONSIBLE FOR PROGRAM ADMINISTRATION AND ANOTHER FOR CONTRACT ADMINISTRATION

The BTP&D is responsible for the *administration* of the operational test. When the test started, the BTP&D was part of the MHD. After a reorganization of the MHD, it was transferred to the EOTC. The MHD is *the contracting agency* for the state. Although the staff of the BTP&D monitors the contract requirements and reviews progress, only the MHD has the authority to reimburse the contractors. After the transfer, some MHD staff members viewed the BTP&D

staff members as outsiders. This situation has increased the level of coordination needed to oversee the operational test.

3.6 USER ACCEPTANCE

This subsection discusses two issues and the lessons learned in the area of user acceptance of the operational test:

ISSUE 1: THE COMMUTING PUBLIC LACKS KNOWLEDGE OF THE SERVICE OR LACKS AN APPRECIATION OF THE SERVICE

Representatives from both the public and private sectors discussed the failure of making the public aware that SmarTraveler exists and provides information that differs from other traffic information sources. They stated that the public perceives SmarTraveler as being nothing more than a service that provides the *same information* that is already available over the radio. Also, focus groups interviewed by the project evaluator did not believe that good traffic information would be available. The public does not consider radio traffic reports reliable and has a low threshold for inaccurate information.

The principal cause of this issue is that the *marketing* effort did not *expose* SmarTraveler properly and educate the public that SmarTraveler provides up-to-the-minute information. The interviewees stated that even regular users *are skeptical* that the information is not up-to-date.

There were several effects on the project. First, there is a *low level* of public awareness, and therefore a weak client base. Second, this lack of knowledge or appreciation may hinder commuters in using the information to make wise travel decisions. Third, the project personnel became critically vigilant of *the quality of information*. Fourth, the project staff focused on establishing a good *reputation*.

The most important **lesson** that was offered was **make sure that the public understands that SmarTraveler offers a unique service and that it offers accurate information that does not duplicate radio broadcasts**. Make sure SmarTraveler is perceived by the general public as a supplier of accurate information.

The interviewees offered some additional lessons:

- Technology exists to provide a good service, but its worth can be determined only if people use it. Failure of the public to adopt the service may hinder the project being a success.
- Establish better name recognition and credibility with the public by associating the project with public agencies.
- The public expects good transit information and is skeptical of traffic information.

- Fewer people are using the system than expected.

ISSUE 2: THE PUBLIC IS NOT USED TO REQUESTING TRAVELER INFORMATION BEFORE MAKING A TRIP

In general, people do not seek traveler information *before* they leave their home or office. Usually, they do not think about traffic until they are stuck in it and tune into the radio for their information. Some commuters feel that there is nothing they can do about traffic congestion. Motorists may not call the system because they feel that the *limited highway network* restricts the number of alternative routes. Also, travelers are not accustomed to seeking traveler information to make mode choices. It is difficult to get people to *change modes* because traveling by automobile is convenient.

Some interviewees suggested that the public must be *educated* on the value of IVHS and good traveler information. They also must be *influenced* to find solutions to the traffic congestion problem. One interviewee stated that supply of traveler information will outpace the demand. Therefore, a market must be created by teaching people how to use an ATIS effectively.

The project participants offered three lessons in this area:

- One cannot assume market acceptance and behavior modification relative to voluntary IVHS technologies.
- Education is essential. Educate the public by making the IVHS agenda accessible. Educate the public on ATIS and specifically, the SmarTraveler project.
- Very often, people tend to use SmarTraveler in special instances, such as bad weather and special events, and not on a regular basis.

3.7 OPERATIONS

The project participants encountered three issues pertaining to the operations of the test system:

ISSUE 1: SMARTRAVELER CANNOT PROVIDE ALTERNATIVE ROUTING INFORMATION TO THE PUBLIC

Representatives from the public sector discussed the long-standing MHD *policy* of not providing alternative route information and not diverting traffic through some city neighborhoods. The primary cause is that public officials from the cities and towns and their constituents do not want additional *traffic* on their streets. The MHD staff respects the desires of these officials because the MHD staff wants to maintain a good *relationship* with local municipalities. This policy coupled with the fact that the Boston-area highway network is limited may *hinder* providing better transportation information to the public.

The interviewees stated that if SmarTraveler offers no alternative routing information, the public is less likely to use it. Individuals may, however, use information provided by SmarTraveler to find route diversions independently.

One public sector participant suggested this **lesson: Increase the usefulness of traffic information to the everyday commuter by providing alternative route information.**

ISSUE 2: THE ACCURACY OF THE SMARTRAVELER INFORMATION WAS QUESTIONED

When the operational test was started, some officials felt that the amount of *coverage* was insufficient. This, in turn, led the officials to question the *accuracy* and *reliability* of the traffic information. This issue was compounded by the fact that the MHD had no infrastructure for collecting the required traffic data in the Boston metropolitan area. In order to qualify for FHWA and MHD support, the amount of coverage had to be increased. This issue affected the project because it took longer than expected to work out the concepts for test design and data collection sources. The issue was resolved sufficiently for the purpose of assessing market reaction, although a small number of users have complained about unreliable information.

Some interviewees also questioned the accuracy of the information that would be provided by the transportation agencies. They stated that transportation agencies may not be *reliable sources* of information because these agencies may withhold information indicative of poor agency performance. It has not been determined if these concerns have become an issue.

One important **lesson** was offered by private and public sector participants: **Be attentive to the information issue and the need for accurate information.** Use of the system depends on the reliability of the information. The information that is provided must be good.

Private sector representatives also offered these lessons:

- Education and time will overcome the potential problem of obtaining unreliable information from public agencies.
- Create an incentive for managers to permit information to flow freely – even negative information, such as problems on the system.
- Diversify sources of information. Use as many as possible, such as cameras, staff members, commuters, bus drivers, etc.

ISSUE 3: THE RELEVANCE OF TRANSPORTATION INFORMATION VARIES AMONG MODES

One project participant stated that the SmarTraveler system is much more useful to *commuter rail* users than to subways and bus users. The commuter rail runs on a schedule and, therefore, advance notice of delays is helpful. Headways vary on the subways and buses and it is difficult to provide accurate delay information.

With respect to providing transit alternatives, this interviewee felt that the SmarTraveler system is better handling *special events* than it is handling day-to-day incidents. Road closings are known in advance and there is more time to react. More specific information can then be provided on regularly scheduled and additional transit service.

One interviewee also mentioned that *transit* information broadcast on the SmarTraveler radio and television partners only mentions system delays and reflects poorly on the transit system. The transit system needs to be mentioned when service is running smoothly and there should be more discussions of *transit alternatives*.

A public sector representative felt that the transit agency realized that a transit information *reporting system* was needed. If the SmarTraveler system is not continued, the transit agency might incorporate a similar automated voice response system into its information system.

3.8 DEPLOYMENT

The interviewees discussed several issues that may affect the full deployment of the SmarTraveler operational test or the deployment of IVHS products and services:

ISSUE 1: THE PROCESS FOR MOVING THE SMARTRAVELER OPERATIONAL TEST INTO FULL DEPLOYMENT IS NOT KNOWN

Because of the newness of IVHS and ATIS, the project participants do not know what is required to *fully deploy* an operational test. They must determine the amount of public and private *involvement*, the length of *time* needed to transition from a test to a deployment, and the sources *offunding*. Currently, there is no guarantee or vehicle for securing funding. One public sector policy maker stressed that the project participants must develop plans for the deployment of the project.

Some project participants also feared that the operational test may not allow enough *time* for the system to gain a large following. They feared that the public sector may not stick with the SmarTraveler project long enough allow the commuting public to go through behavior modification and adopt a volunteer, technology-based ATIS.

Some public and private sector interviewees offered conflicting lessons. One private sector representative said that if the public sector wants the private sector to help accomplish a public objective, such as alleviating congestion, then the public sector must be willing to *subsidize the* program. A public sector representative stressed that procedures for *phasing out* public funding must be established. This interviewee also stated that operational tests should not become a burden to public agencies, causing state agencies to decline supporting future operational tests.

The interviewees offered two additional lessons:

- Clarify post-operational test plans and determine phase-out procedures.
- Do not rush the project. Allow the project to play itself out long enough to test and learn from it.

ISSUE 2: SMALL COMPANIES MAY NOT PARTICIPATE IN DEPLOYING IVHS PRODUCTS AND SERVICES

One private sector participant mentioned that a *mature industry* and *hard rules* may prevent small companies from entering the IVHS market. A new industry is initially open to small innovative companies. Opportunities for smaller companies, however, decrease once the stakes get higher. Eventually, larger businesses often *squeeze* them out of the industry.

This interviewee offered a **lesson**. The government must **let the marketplace play itself out** before implementing procurement processes. In particular, the FHWA needs to keep doors open to small companies and prevent larger companies from exhausting the market. The FHWA needs to promote the creation of new ideas. Another private sector representative suggested that the public sector must create or *develop a market* and provide *an incentive* for private sector participation.

ISSUE 3: FINANCIAL LIMITATIONS MAY IMPEDE THE DEPLOYMENT OF IVHS TECHNOLOGIES

One interviewee stated that *the financial constraints* imposed on the operational tests may limit the technologies that can be used by excluding currently *expensive technologies*. This, in turn, may limit the amount of information that can be gathered from the monitoring sites and the amount of information that can be disseminated to the public. Another interviewee believed that there are not enough operational tests which may hinder determining what technologies would be the best way to get information to travelers. One interviewee urged Congress to **put “bones” on the funding process** and allow the technologies to evolve naturally.

ISSUE 4: THE LACK OF STANDARDS WILL AFFECT THE DEPLOYMENT OF IVHS

One private sector representative stated that the potential for research and development (R&D) of IVHS technologies is constrained. Because private sector firms, especially small ones, are not sure what technologies will be used in IVHS applications, *they are reluctant* to invest in R&D. This also restricts potential expansion of products and services to other agencies and geographical areas. One interviewee feared that advances in technology may outpace the development of a system architecture.

APPENDIX A

ACRONYMS AND ABBREVIATIONS

ATIS	advanced traveler information system
CSF	critical success factor
CTPS	Central Transportation Planning Staff
DOT	Department of Transportation
FHWA	U.S. Department of Transportation Federal Highway Administration
ISTEA	Inter-modal Surface Transportation Efficiency Act of 1991
IVHS	intelligent vehicle - highway system
MAPC	Metropolitan Area Planning Council
Massport	Massachusetts Port Authority
MBTA	Massachusetts Bay Transportation Authority
MPO	metropolitan planning organization
MSP	Massachusetts State Police
MTA	Massachusetts Turnpike Authority
R&D	research and development
RFP	request for proposals
SPR	statewide planning and research
SRS	SmartRoute Systems Limited Partnership
U.S. DOT	U.S. Department of Transportation
VMS	variable message signs
Volpe Center	U.S. Department of Transportation John A. Volpe National Transportation Systems Center

APPENDIX B

REFERENCES

Massachusetts Department of Transportation and SmartRoute Systems. "SmarTraveler: An Operational Test of an Area-Wide ATIS Service for Eastern Massachusetts - Phase 1 Summary Report," April 1, 1993.

Massachusetts Department of Transportation and SmartRoute Systems. "SmarTraveler: Quarterly Report - January 13-April 13, 1993," June 30, 1993.

Massachusetts Department of Transportation and SmartRoute Systems. "SmarTraveler: Quarterly Report - April 14-July 13, 1993," August 18, 1993.

Multisystems, Inc. "Evaluation of Phase II of the SmarTraveler Advanced Traveler Information System Operational Test," Cambridge, Massachusetts, July 31, 1994.

SmartRoute Systems. "SmarTraveler: Quarterly Report - April 1-June 30, 1994," August 4, 1994.

SmartRoute Systems. "SmarTraveler: Quarterly Report - July 1-September 30, 1994," October 12, 1994.

SmartRoute Systems. "The SmarTraveler Operational Test: Early Findings - October 30, 1992-March 30, 1993," May 4, 1993.

APPENDIX C

OPERATIONAL TEST CASE STUDY REPORTS

IVHS Institutional Issues and Case Studies -ADVANCE Case Study

FHWA-SA-94-055

DOT-VNTSC-FHWA-94-9

NTIS Number: PB 94-186 160

IVHS Institutional Issues and Case Studies -Advantage I-75 Case Study

FHWA-SA-94-056

DOT-VNTSC-FHWA-94-10

NTIS Number: PB 94-186145

IVHS Institutional Issues and Case Studies - HELP/Crescent Case Study

FHWA-SA-94-057

DOT-VNTSC-FHWA-94-11

NTIS Number: PB 94-187101

IVHS Institutional Issues and Case Studies - TRANSCOM/TRANSMIT Case Study

FHWA-SA-94-058

DOT-VNTSC-FHWA-94-13

NTIS Number: PB 94-183514

IVHS Institutional Issues and Case Studies - TravTek Case Study

FHWA-SA-94-059

DOT-VNTSC-FHWA-94-12

NTIS Number: PB 94-186111

IVHS Institutional Issues and Case Studies - Westchester Commuter Central Case Study

FHWA-SA-94-060

DOT-VNTSC-FHWA-94-14

NTIS Number: PB 94-1 86152

IVHS Institutional Issues and Case Studies -Analysis and Lessons Learned

FHWA-SA-94-061

DOT-VNTSC-FHWA-94- 15

NTIS Number: PB 94- 184322

IVHS Institutional and Legal Issues Program - Review of the FAST-TMC Operational Test

FHWA-SA-94-067

DOT-VNTSC-FHWA-94-17

NTIS Number: PB 94-186103

IVHS Institutional and Legal Issues Program - Review of the Travlink and Genesis Operational Test

FHWA-SA-94-07 1

DOT-VNTSC-FHWA-94-18

NTIS Number: PB 94-203296